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Report Highlights:
There has been no progress in development and commercialization of agricultural biotechnology in Thailand since the latest report in 2005. Despite its world-class research capacities on biotechnology, Thailand is still very far from adopting agricultural biotechnology for commercial cultivation. There is no clear-cut policy on the future of agricultural biotechnology research and development, and field trials on transgenic plants are banned. This lack of development is mainly because of an absence of policy leadership by politicians, nods to threats by anti-GMO non-government organizations (NGOs), the fear of losing food export markets, and the fear of foreigners monopolizing benefits from GMO seed sales and property right claims.

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SECTION I: EXECUTIVE SUMMARY

In the early 1980's, the Royal Thai Government (RTG) set up the National Center for Genetic Engineering and Agricultural Biotechnology (BIOTEC). Since then, BIOTEC, Department of Agriculture (DOA), and many universities have conducted research into the development of plant genetic engineering. Although there has been some research progress over the past 20 years in a few locally grown plants and vegetables and field-testing for imported transgenic plants, it is surprising that deregulation is stalled and there still is no commercial production of transgenic crops in Thailand. This lack of forward movement is apparently caused by political concerns arising from strong opposition from non-government organizations (NGOs), especially BioThai and Organization of the Poor, and fears that Thailand might lose food export markets, especially in the EU if GM technology were to be commercialized. In addition, there is misperception that cultivation of GM crops will lead the way for foreigners to captivate benefits from GMO seed sales and property right claims. These political concerns and misperception among some groups in the Thai society have resulted in a lack of long-term policies/strategies on agricultural biotechnology.

At present, Thailand does not allow importation and production of any transgenic plants for commercial purpose and field trials except for: (1) processed food and (2) imports or sales of soybeans and corn for feed use, human consumption, and industrial use. Furthermore, all trials conducted for research purposes must be contained in laboratories or greenhouses. The Thai Food and Drug Administration (FDA) also imposed "voluntary" GM labeling requirements for processed products containing GM ingredients at 5 percent tolerance.

Despite having general biosafety guidelines and multiple biosafety-related agencies and institutions Thailand has not adopted a National Biosafety Law or Framework to monitor and enforce the law on biosafety management thus far. In 2001, the NGOs used this lack of a National Biosafety Law to press the Cabinet to suspend field-testing of all transgenic plants in Thailand. The Cabinet succumbed to NGO pressure in April 2001.

Thailand recently issued its National Biotechnology Policy Framework (2004-2009) to promote biotechnology as an important tool for the country's development to increase competitiveness, reduce poverty, promote income distribution, and improve social capital development. However, this framework, in views of some scientists, is a very superficial effort and will be difficult to achieve unless the RTG can overcome fears of NGO opposition and develop a mature understanding about impact on export markets.

SECTION II: BIOTECHNOLOGY TRADE AND PRODUCTION

Thailand is known to be the world largest exporter of a wide range agricultural products (rice, tapioca products, rubber, frozen shrimp, canned tuna, and canned pineapple) and a top-ten world exporter of others (chicken meat, seafood, and sugar). Nevertheless, productivity on several crops is relatively low compared to major producing countries. For example, Thailand's paddy productivity is among the lowest in Asia while the chemical uses are among the highest, translating into high cost of production.

Realizing that low farm productivity may become a serious threat to Thai agriculture in the future, the RTG has made several efforts to improve agricultural productivity over the last few decades through increasing irrigation, promoting the use of high-yielding hybrid seeds, stabilizing crop prices, etc. Importantly, the RTG determined that introduction of modern agricultural biotechnology should be the most efficient way to increase production and improve the country's comparative advantage on farming. It seemed that Thailand was off to a good start when the RTG set up the National Center for Genetic Engineering and Agricultural Biotechnology (BIOTEC) in 1983. Since then, BIOTEC, the Department of Agriculture, and many universities conducted research into the development of plant genetic engineering. It is commonly said that Thailand was the first country in Southeast Asia that adopted agricultural biotechnology. There has been some progress made in a few locally grown plants and vegetables such as tomato, chili, rice, and papaya. Research on ring-spot virus resistant papaya has developed to the point that it is likely to be the first transgenic crop for commercial cultivation in Thailand.

In addition to research on domestic plants, the first field test of imported transgenic seed was conducted in Thailand in 1994. The first crop plant permitted to be field-tested was the Flavr Savr tomato, a delayed ripening tomato. During 1994-2000, there were many other imported transgenic plants that obtained permits for confined field-testing in Thailand, including Bt cotton, Bt corn, Round-up Ready cotton, Round-up Ready corn, Antisent RNA tomato, CP-gene of papaya PRSV, etc. Among these, Monsanto's Bt cotton underwent the confined large-scale field trials in the country, from March 1996 until the year 1999. It was expected that this Bt cotton would be the first transgenic crop for commercial planting in Thailand. While the field trials convinced onlookers of the environmental safety of the crop and of significantly reduced cost of production, strong opposition from several NGOs stymied the RTG's decision. Market introduction of this Bt cottonseed has remained suspended thus far. The details of imported transgenic plants that were permitted for confined field-testing are presented in Appendix A.

Although there has been some research progress over the past 20 years and field trails for a few imported transgenic plants were completed, it is surprising that deregulation is stalled and there still is no commercial production of transgenic crops in Thailand. This lack of forward movement is apparently caused by political concerns arising from strong opposition from non-government organizations (NGOs), especially BioThai and Organization of the Poor, and fears that Thailand might lose food export markets- especially in the EU if GM technology was commercialized. These political concerns have resulted in a lack of long-term policies/strategies on agricultural biotechnology.

An invasion by Green Peace activists destroyed transgenic papaya fields in a research station of the Department of Agriculture (DOA) in early 2005. The RTG's reluctance to establish a clear-cut policy on the future of agricultural biotechnology research and development signals onlookers that commercialization of biotech crops in Thailand remains elusive.

SECTION III: BIOTECHNOLOGY POLICY

3.1 The Current Biotechnology Policy

Based on the Cabinet's decision on April 3, 2001, and the Plant Quarantine Act B.E. 2507 Amended, Thailand does not allow importation and production of any transgenic plants for commercial purpose and field trials except for: (1) processed food; and (2) imports or sales of soybeans and corn for feed use, human consumption, and industrial use. Furthermore, all trials conducted for research purposes must be contained in laboratories or greenhouses.

As for processed food containing GMOs plant materials, the Ministry of Public Health labeling law for food containing Genetically Modified Organisms (GMO) materials/products was put in place on May 11, 2003. The so-called consumer protection regulations were reportedly based on the Japanese model allowing for a 5 percent tolerance.

The products covered by this law are listed as follows:
1. Soybeans
2. Cooked soybean
3. Roasted soybean
4. Bottled or canned soybean or soybean contained in retort pouch
5. Natto
6. Miso
7. Tofu or Tofu fried in oil
8. Frozen tofu, soybean gluten from tofu or its products
9. Soybean milk
10. Soybean flour
11. Food containing product(s) from (1) to (10) as main ingredient
12. Food containing soybean protein as main ingredient
13. Food containing green soybean as main ingredient
14. Food containing soybean sprout as main ingredient
15. Corn
16. Popcorn
17. Frozen or chilled corn
18. Bottled or canned corn or corn contained in heat-treated pouch
19. Corn flour or cornstarch
20. Snack foods deriving from corn as main ingredient
21. Food containing product(s) from (15) to (20) as main ingredient
22. Food containing corn grits as main ingredient

In the case that the product has one of 22 listed products as the only principle ingredient, labeling will be required if the GMO content in that ingredient is 5 percent or more of the final product weight. In the case that the product has any of the 22 listed products as the first three principle ingredients, labeling will only be required if each ingredient constituting 5 percent or more of the final product weight and the GMO content by weight in that ingredient is 5 percent or more.

Due to a lack of laboratory facilities, the Ministry of Public Health implements the regulation enforcement on a post-marketing basis. This means that product labeling by the producer/importer will be voluntary on their judgment. However, unlabelled products may be confiscated and the producer/importer will be subject to the penalties applicable if the government inspector proves that the products are supposed to be GMO labeled. More details about GMO labeling procedures are provided in the Manual for Labeling Procedures for GMO Products according to the Ministerial Notification No. 251, B.E. 2545 (2002) (Thai language).

3.2 Responsible Government Agencies and Institutes and Agricultural Biotechnology

There are many government agencies and institutes/universities involved in biotechnology research and development and regulating the use of biotechnology at different levels. The role and responsibilities of these agencies or institutes are presented in the table below.

Institute	Role	Responsibilties
National Center for Genetic Engineering and Biotechnolgy (BIOTEC), Ministry of Science and Technology (MOST)	- Research and Development - Supporting institute	- Research and development on genetic engineering - Technical advisory - Funding agency - DNA technology laboratory
Department of Agriculture (DOA), Ministry of Agriculture and Cooperatives (MOAC)	- Competent National Authority - Research and Development Institute emphasizing on plants	- Regulating imported GMO seed for planting - Conducting research and development on plant genetic engineering and risk assessment
Food and Drug Administration (FDA), Ministry of Public Health (MOPH)	Regulate trade on GM food products	Regulating and monitoring the use of GM food including labeling
Department of Trade Negotiations and Department of Foreign Trade, Ministry of Commerce (MOC)	Regulate and coordinate international negotiation in trade on GM products	Regulating imports of GM products used as raw materials and coordinating with competent agencies for international negotiations
Ministry of Natural Resources and Environment (MONRE)	- National Focal Point - Coordinators for risk assessment on environmental aspect	- Being the National Focal Point for Convention on Biological Diversity (CBD) and Cartagena Protocol on Biosafety (CPB) - Fully responsible for drafting the National Biosafety Law
National Bureau of National Agricultural Commodity and Food Standards (ACFS), Ministry of Agriculture and Cooperatives (MOAC)	A National Focal Point for Agricultural and Food Standards (SPS issues)	Representing the RTG to negotiate all SPS issues in international organizations (such as CODEX, OIE, etc.)
Other institutes (e.g. Universities)	Academic and research and development institute	- Research and Development on genetic engineering - Provide training on modern biotechnology

3.3 National Biosafety Framework

BIOTEC was the first agency that was created to deal with modern biotechnology, given the importance of biosafety regulations to ensure that all products derived from modern biotechnology are safe for human health and the environment. The first two Thai guidelines were prepared in 1992, including (1) Biosafety Guidelines in Genetic Engineering and Biotechnology for Laboratory Work, and (2) Biosafety Guidelines in Genetic Engineering and Biotechnology for Field Work and Planned Release.

As a part of the implementation of these guidelines, the National Biosafety Committee (NBC) was established in 1993. There are 9 sub-committees under the NBC that cover a wide range of related areas: plants, animals, fisheries, micro-organisms, food, public health, environment, social and economic aspects, and law. The NBC also encouraged the establishment of the Institutional Biosafety Committees (IBC) in educational institutes and at Thai universities. At present, there are 24 IBCs in Thailand.

The implementation of the guidelines, for example for field-testing, is conducted through various biotechnology institutes. The IBC is responsible for research work at its own institute, in consultation with the NBC.

Despite establishing several biosafety-related agencies/institutions, Thailand has not adopted the National Biosafety Law/Framework to monitor and enforce the law on biosafety management. In 2001, the NGOs used this lack of a National Biosafety Law to press the Cabinet to suspend field-testing for all transgenic plants in Thailand. The Cabinet complied with the NGOs' request in April 2001.

The RTG set up the Sub-Committee on Drafting National Biosafety Law under the supervision of Ministry of Natural Resources and Environment (MONRE) in 2003. According to government officials, although Thailand has not ratified the Cartagena Protocol on Biosafety (CPB), the content of the drafted legislation will mostly follow the guidelines in the Protocol. The draft legislation was finalized in February 2006, and is now under the process of public hearing. According to Ministry of Natural Resources and Environment (MONRE), once the public hearing finishes, the draft will be edited and sent to the National Biosafety Law Committee for reviewing and then will be submitted to the Parliament for final approval. Due to a political deadlock in Thailand at the moment (general election is scheduled to be conducted again in October 2006), it is likely impossible to enforce this law by the end of 2006 as originally anticipated.

3.4 National Biotechnology Policy Framework

On March 18, 2003, the Cabinet agreed to set up the National Biotechnology Policy Committee (NBPC), chaired by the Prime Minister, and assigned National Science and Technology Development Agency (NSTDA) as the Committee's Secretariat. In December 2003, the NBPS approved the National Biotechnology Policy Framework (2004-2009) which was proposed by the NSTDA.

Following are the conclusions of this framework:

By 2009, Thailand will develop biotechnology as an important tool for the country's development to increase competitiveness, reduce poverty, promote income distribution, and improve social capital development. New technologies, including Genome, Bioinformatics, Genetic Engineering, will be utilized to develop agricultural production, bio-medical products, enviremental-protection products, high value-added products, etc.

The framework proposed 6 goals of biotechnology development:
Goal 1: Modern Biotech business will emerge and develop. Under this goal, Thailand targets to emerge at least 100 companies of modern biotechnology and to invest R&D in biotechnology by the private sector with the annual investment of 5,000 million baht (approx. US$ 125 million);

Goal 2: Thailand will become a Kitchen of the World. Thailand will incorporate the use of modern biotechnology to increase production of major crops, become a seed exporter, and increase high value added products from agricultural commodities;

Goal 3: Thailand will become a healthy society and a hub for Asian health business;

Goal 4: Modern Biotech will conserve the environment and create clean energy production;

Goal 5: Modern Biotech will help rural economy accomplish its self-sufficiency; and

Goal 6: Develop skilled labor forces in biotechnology. Under the goal, Thailand targets to have at least 5,000 biotech researchers, 500 biotech management staff, and 10,000 university graduates (including undergraduate, graduate, and Ph.D. levels), by 2009.

This framework, in views of some scientists, is a very superficial effort and will be difficult to accomplish unless the RTG can overcome paralysis by NGO opposition and other worries about export markets.

SECTION IV: MARKETING ISSUES

In Thailand, there is still misunderstanding and misperception about the safety of transgenic plants or foods for human health and the environment. NGOs, especially Green Peace Thailand and Organization of the Poor, have strongly opposed the introduction of transgenic crop planting or field-testing. In the meantime, the mass media in Thailand, including newspapers and television, usually provide largely unbalanced reporting by enlarging the negative views while minimizing the positive views about modern biotechnology.

The latest official surveys on public awareness, perception, and attitude toward GMOs in Thailand were conducted by BIOTEC in 1999 and again in 2000, when the GMO issue was of high concern among well-informed Thais due to media coverage of anti-GMO groups and a GM food export problem with some trading partners. In general, there was high consistency between the results of these two surveys.

Regarding awareness and some basic knowledge concering GMOs, the result of the surveys indicated that the target group mostly understood GMOs and some basic biology although degree of uncertainty increased with more detailed questions. On perception of the GMO issue, respondents showed a tendency not to worry very much about the safety of GM food consumption. Perceived risks were more apparent in trade and environment issues. It was also interesting that highly educated respondents stressed the importance of public education in GMO issues. Regarding attitude toward GMOs and related public policy, the surveys showed that a majority of respondents supported research and development of GMOs despite the overall anti-GM sentiment in the media. In regard to what measures the country should implement to address the GMO problem, the choices of scientific capacity building and public education/information were of the highest priorities in both surveys. As to the question of labeling issue, about 80 percent of respondents wanted mandatory labeling. In addition to R&D institutions and regulators, respondents needed an institution representing a reliable source of information and helps public understanding.

SECTION V: CAPACITY BUILDING AND OUTREACH

In recent years, the U.S. Government (USG) conducted several programs of capacity building and outreach for Thai government offices and officers through both USDA-funded and USG-funded activities. These activities in the past 5 years can be summarized below:

- Annual biotechnology training program at Michigan State University under the Cochran Fellowship Program. About 10 officials from Ministry of Science and Technology and Ministry of Agriculture and Cooperatives participated in this program thus far;
- World-renowned scientists, biotechnology experts, and groups of U.S. farmers separately visited Thailand to meet with different levels of government, Cabinet and officials, and conduct seminars in Thailand. These include visits of Dr. Norman Borlaug (1999), A group of U.S. corn farmers who came to share experiences using GMOs with Thai farmers (2000), Dr. Val Giddings (Vice President, Biotechnology Industry Organization, August 2003), Ms. Cindy Richard (Biotech Consultant, staying in Thailand for 3 months to help Thai government develop outreach efforts to the public and farmers in 2004);
- USDA sponsored high-level officials from Thailand to participate the Asian Pacific Economic Cooperation (APEC)'s dialogue on biotechnology in Mexico (2002), Chiang Rai, Thailand (2003), Malaysia (2004), and Seoul (2005);
- The USG sponsored the Hilo Papaya Outreach Project by inviting 12 Thai farmers and media reporters to observe GM and non-GM papaya plantations and discuss issues with scientists and farmers in Hawaii in May 2005.

Country-specific needs or strategies that would be useful in raising the capacity of Thailand to apply transparent, science-based regulations to agricultural biotechnology should include:

- Thailand is under the process of developing a National Biosafety Framework. The biosafety issues are new to many relevant government officials and scientists. As a result, short course training in the areas of risk assessment and of various policy and legal aspects should be continued for both local scientists and policy makers;
- Although public education has been conducted frequently, it has been very difficult to change misperceptions about modern biotechnology, especially from the anti-GM NGOs. As a result, new strategies to better educate or understand this technology are needed, along with more frequent, sustained efforts to do so;
- The various biotech-related agencies are developing a biosafety database for Thailand and could benefit from training or capacity building in this task;

SECTION VI: REFERENCE MATERIAL

Websites:

- Ministry of Science and Technology: http://www.most.go.th/
- National Center for Genetic Engineering and Agricultural Biotechnology (BIOTEC): http://policy.biotec.or.th/
- Thailand Biosafety Information Network: http://biosafety.biotec.or.th/
- Office of Environmental Policy and Planning, Ministry of Natural Resources and Environment: http://www.onep.go.th/
- Department of Agriculture, Ministry of Agriculture and Cooperatives: http://www.doa.go.th/th/
- CropLife Asia: http://www.croplifeasia.org
- International Service for the Acquisition of Agri-Biotect Applications: http://www.isaaa.org
- Biothai (An NGO in Thailand which is against GM crop introduction): http://www.biothai.org/
- Greenpeace South East Asia: http://www.greenpeace.org/seasia/en/

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Damrongchai Nares. Agricultural Biotechnology in Thailand, BIOTEC.

Iamsupasit Nipon. Thailand Country Report on Biosafety – Risk Assessment and Management, Paper submitted at Asia Regional Workshop on Risk Assessment and Risk Management to implement the Cartegena Protocol, New Delhi, India, 22-24 May 2002.

Jumroonpong Benjawan. Importation of Transgenic Plants: Rule and Regulations, Paper submitted at Asia Regional Workshop on Biosafety, 22-24 May 2002, New Delhi, India.

Napompeth Banpot. National Biosafety Framework (NBF) in Thailand, Paper presented at the International Workshop on Impacts and Biosafety of Genetically Modified Agricultural Product, Taipei, Taiwan, ROC, 9-14 September 2002.

Napompeth Banpot. GMOs and GMO Derivatives under Trials in Containment and/or Small Scale Field Trials in Thailand: 1991-2003, National Biosafety Committee, BIOTEC, 2003.

National Center for Genetic Engineering and Agricultural Biotechnology (BIOTEC), National Biotechnology Policy Framework 2004-2009 (in Thai), National Science and Technology Development Agency (NSTDA), 2004.

APPENDIX A

A List of Transgenic Plants that were under the Import Permit Requests (1994-2000)

Crop	Applicant(s)	Year of Request	Trait Description	Status
1. Squash	Asgrow Seed	1994	-	-
2. Tomato	Thai Pan Trading Co., Ltd	1994	-	Not permitted
3. Tomato	UpJohn Inc.	1995	Antisent RNA (delayed fruit ripening)	Trial completed
4. Tomato	Thai Pan Trading Co., Ltd.	1995	-	Not imported
5. Cotton	Monsanto Thailand Ltd.	1995	Bt Cry 1A ©	Trial completed
6. Corn	Novartis Thailand Co., Ltd.	1996	Bt	Approved under containment at Novartis experiment station
7. Cotton	Monsanto Thailand Ltd.	1996	Bt Cry 1A ©	Trial completed
8. Squash	Department of Agriculture	1996	Coat Protein PRSV	Trial contained in lab and greenhouse
9. Mali 105 Rice	Department of Agriculture	1997	Xa21	Trial contained in greenhouse
10. Papaya	Department of Agriculture	1997	CP-gene of PRSV	Trial in field planting in DOA's research station
11. Cotton (NUCOTN 33 B)	Monsanto Thailand Ltd.	1997	Bt Cry 1A © (Resistant to American ballworm)	Trial completed
12. Cotton (roundup 1445, 1698)	Monsanto Thailand Ltd.	1997	CP 4EPSPS	Trial completed
13. Corn	Pioneer Overseas Seeds Corp. Thailand	1997	Bt (Mon 810) Resistant to Asiatic corn stalk borer	Trail contained in greenhouse
14. Dry, Powdered Bt Corn	Dekalb Genetics Corp.	1997	Bt	Approved by NBC, no response
15. Corn	Monsanto Thailand Ltd.	1997	Bt	Inappropriate imports, destroyed
16. Corn (roundup)	Monsanto Thailand Ltd.	1997	Roundup resistant	Inappropriate imports, destroyed
17. Tomato	A local company	1997	SAVR	Not permitted

Crop	Applicant(s)	Year of Request	Trait Description	Status
18. Corn (Glyfosate herbicide resistance)	Monsanto Thailand Ltd.	1998	mEPSPS	Trial contained in greenhouse
19. Corn	Monsanto Thailand Ltd.	1998	Bt (Mon 810)	Trial completed in greenhouse
20. Corn (DLL25 Glyfosinate resistance)	Charoen Produce Co., Ltd.	1998	PAT	Not permitted
21. Corn (CHAW 9703 Bt)	Cargill Seed Co., Ltd.	1998	Bt Cry 1 A (b)	Trial suspended
22. Corn (Bt event 176)	Novartis Thailand Co., Ltd.	1998	Bt event 176	Not appropriate imports, destroyed
23. Hybrid Corn Bt. Event 176	Novartis Thailand Co., Ltd.	1998	Bt event 176	Trial completed
24. Hybrid Cotton non-Bt	Mansanto Thailand Ltd.	1999	Bt cry 1A ©	Trial completed
25. Cotton (roundup resistance, line 1445)	Monsanto Thailand Ltd.	1999	CP 4EPSPS	Trial completed in greenhouse
26.Corn GA-21 (roundup resistance)	Monsanto Thailand Ltd.	1999	mEPSPS	Trial completed in greenhouse
27. Corn	Monsanto Thailand Ltd.	1999	Bt (Mon 810)	Trial contained in small field plot
28. Corn Chaw 9703	Monsanto Thailand Ltd.	2000	Glyfosate resistance	-
29. Corn C-919 Bt	Monsanto Thailand Ltd.	2000	Bt Cry 1A (b)	Pending Request for field trial
30. Corn C-919 603 (roundup resistance)	Monsanto Thailand Ltd.	2000	CP-EPSPS	Pending request for trial lab and greenhouse
31. Papaya	Kasetsart University	2000	CP-gene of PRSV	Trial contained in lab and greenhouse
32. Cotton NUCOTN33 (American bollworm resistance)	Monsanto Thailand Ltd.	2000	Bt cry 1A ©	Field Trial completed

End of Report.